The ECCO Routine Global Ocean Data Assimilation System

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An ocean data assimilation system producing regular analyses is established so as to monitor global ocean circulation and to better understand processes underlying the ocean's seasonal-to-interannual changes. The system is based on a near-global primitive equation model of high resolution (1-deg telescoping to 0.3-deg with 10m near surface layers). Measurements from satellite altimetry (TOPEX/POSEIDON, Jason-1) and in situ hydrography (XBTs, moorings, floats, and climatology) are assimilated. The assimilation is based on a hierarchical approach that consists of 1) a Green's function method to adjust gross characteristics of the model, 2) a partitioned Kalman filter and smoother for routine assimilation and analysis, and 3) an adjoint method for periodic rigorous optimization. The data assimilation system is part of the consortium "Estimating the Circulation and Climate of the Ocean (ECCO)". Analyses are regularly updated and are available via a Live Access Server at http://www.ecco-group.org/las. The analyses are characterized by the physical consistency of their temporal evolution. Various conservation statements (e.g., continuity) are satisfied that permit mechanisms of ocean circulation to be evaluated. The data assimilation system will be presented, its fidelity validated, and examples of its applications described.